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DISEASES DUE TO PROTOZOAN PARASITES.

WALRAVENS (P.). **Note concernant le *Trypanosoma rodhaini* Walravens.** [A Note on *T. rodhaini* Walravens.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan 1. Vol. 4. No. 1. pp. 31–32. With 1 text fig.

In this brief note the author gives measurements of 100 trypanosomes and a short description of the morphology of the parasite.

The nucleus is situated anterior to the middle point of the body, and occupies the whole width of it. The blepharoplast is always very close to the posterior end and is in close contact with the margin of the body. There is a moderately long free flagellum, and the parasite is always monomorphic.

In the fresh state the parasite executes slight wriggling movements which do not involve translation, resembling the movements shown by *T. congolense*. The organism is extremely pathogenic for the pig, but appears to be incapable of infecting the guineapig and rabbit.

[*Note by the Editor.*—In connection with the above publication, Mr. H. E. Hornby has sent to the Director of the Bureau a copy of the following letter which he addressed to the Editor of the *Annales de Parasitologie* :—

In the last number of your paper, Vol. 4, No. 1, you publish a brief description of *Trypanosoma rodhaini* Walravens. I wish to point out that in the *Veterinary Record*, 1923, Vol. 3, pp. 531–532, I described an outbreak of porcine trypanosomiasis in this country, of which the causal trypanosome appeared to be the same as that now claimed by Walravens as a new species. In my opinion the parasite is *T. uniforme* Bruce and others, 1911, and I cannot understand on what grounds Walravens is justified in calling it a new species. His description fits sufficiently well that of *T. uniforme*, and although the measurements given in the text are not quite those of this species, yet the specimens figured measure, according to the scale on the plate, between 14 microns and 20 microns, which are the ordinary limits of length of *T. uniforme*. Until this parasite is maintained in a laboratory, and its range of pathogenicity and its development in the tsetse (if any) ascertained, it is surely advisable to refrain from stating confidently that it is a new species.

H. E. HORNBY,

Veterinary Pathologist, Mpapwa, Tanganyika.]

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DUKE (H. Lyndhurst). **A Discussion on *Trypanosoma rhodesiense*.**—*Parasitology*. 1926. Jan. Vol. 18. No. 1. pp. 67–73.

This paper is a reply to a criticism by BRUMPT of Duke's publications regarding the identity of *T. rhodesiense*.

VAN SACEGHEM (R.). **Le traitement des trypanosomiases animales avec le 205 Bayer (Naganol).** [The Treatment of Animal Trypanosomiases by "Bayer 205."]—*Ann. Soc. Belge Med. Trop.* 1925. June. Vol. 5. No. 1. pp. 101–107.

The drug has been used in 20 per cent. solution in distilled water without sterilization. The solution was of a pale pink tinge, which subsequently became dark red. The animals used in the tests were infected with *T. vivax* or *T. congolense*.

Doses of 5 grammes per 100 kilos injected intravenously into cattle infected with *T. congolense* cleared the circulation of trypanosomes for a period not exceeding 27 days. In young animals the period was longer than in adults. The average period in the case of the latter was 9 days. Twelve animals were used in the test.

Three animals infected with *T. vivax* were similarly treated, and the period of absence of trypanosomes from the blood was only a week. Doses at the rate of 15 grammes per 100 kilos proved fatal. Doses of 2·5, 3 and 5 grammes per 100 kilos given after a preliminary clearance of the circulation had passed caused only very brief disappearance of the parasites from the blood stream.

In three experiments doses of 5 g. of "Bayer 205" per 100 kilos were injected into animals which were subsequently inoculated with blood containing *T. congolense*, the intervals ranging from a fortnight down to simultaneous injection of the drug and the blood. All the animals became infected.

One bovine which was given 15 g. of the drug died 12 hours later.

HORNBY (H. E.). **Tryparsamide and *Trypanosoma congolense* Infection of Bovines.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Nov.-Dec. Vol. 19. Nos. 5-6. pp. 317–320. With 1 text fig.

T. congolense is the cause of the majority of cases of nagana in bovines from Zululand to the Sudan. Tartar emetic stands alone at present as being of value for treatment of the disease, which, untreated, almost invariably terminates fatally. With tartar emetic, however, results are not sufficiently good to allow of any relaxation in efforts to find something superior to it. Hornby has had the opportunity of testing the value of tryparsamide on cattle infected with nagana, and has given it intravenously in concentrated solution in water.

100 cc. of 10 per cent. solution was found to be ineffective for clearing the circulation for more than 5 days. Similarly, 20 gms., dissolved in 80 cc. of water, failed to clear the circulation for more than a few days.

Forty-five grammes administered in four doses of 10 g. and one of 5 g. on successive days, failed to clear the circulation. This animal died, but no lesions attributable to the drug could be found.

Fifty grammes administered in 10 g. doses on successive days was not lethally toxic, nor did it clear the circulation. In fact, on the

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fifth day after the treatment the animal's blood was swarming with trypanosomes.

Hornby concludes that tryparsamide " appears to make the blood extraordinarily favourable for the multiplication of the parasites."

VAN SACEGHEM (R.). **Note préliminaire sur l'action du tryparsamide dans les trypanosomiases animales.** [Preliminary Note on the Action of Tryparsamide in Animal Trypanosomiases.]—*Ann. Soc. Belge Med. Trop.* 1925. June. Vol. 5. No. 1. pp. 65–67.

The author tried the drug in 40 per cent. solution in distilled water for the treatment of two animals infected experimentally with *T. congolense.* The first received 40 grammes in the course of three intravenous injections given during a period of 7 days, and the second the same quantity in two doses of 20 grammes each with an interval of 5 days.

Trypanosomes did not disappear from the circulation, and both animals died, apparently as a result of poisoning by the drug.

CURSON (H. H.). **Die Behandlung von " Nagana " mit Brechweinstein in Zululand in den Jahren 1921-1923.** [The Treatment of Nagana in Zululand by means of Tartar Emetic, 1921–1923.]—Inaug. Dissert. Veterinary High School, Hannover, 1926. 94 pp. With 2 maps, 3 charts and 12 figs.

The disastrous epidemics of nagana in 1920 caused the establishment of veterinary and entomological research stations in Zululand. The author was placed in charge of the Veterinary Laboratory, and the thesis represents the results of his work during the years 1921–1923.

In the author's view the name nagana is not applicable only to infections caused by *T. brucei,* but to those caused by *T. congolense.* In equines and canines *T. brucei* produces an acute infection and blood examination is reliable for determining the possible action of drugs, but in *T. congolense* infections trypanosomes may be absent from the circulation for long periods. The only reliable guide as to the efficacy of the drug in such cases is whether or not the animal improves in condition.

The longer the duration of improvement brought about, the more efficacious the drug. The time of year is of importance in this connexion, for as pasture improves after spring rains infected animals may lose all clinical evidences of disease. Unless adequate attention is given to protect such animals from cold and wet, and from overwork and starvation, a large proportion are likely to relapse and die. Another difficulty in Zululand is that it is generally impossible to say whether an animal has relapsed or has been re-infected for the reasons that Glossina is so widely distributed and herding is so careless.

The author gives an extensive review of the literature dealing with the administration of tartar emetic in the treatment of trypanosomiasis, and points out that a large proportion of the work has been done with laboratory animals, the value of which is from the field point of view limited, very largely because laboratory animals are well kept and fed.

The drug, which was administered intravenously, was dissolved, at first, in normal saline, but subsequently in water. Yearling bovines received 1 gramme, adults 1·5 g., donkeys 1 g., the solution used being 5 per cent. In some cases the solution was used at 10 per cent. strength, without ill effects.

It is important to begin treatment as early as possible as this gives a better chance of recovery; it also lessens the risk of the animal acting as a reservoir for direct transmission. In giving the injections any introduction of the drug under the skin must be avoided as serious local lesions may develop if this occurs. As a routine method five injections on consecutive days are advised. Since an animal which is improving in condition may nevertheless have parasites in its blood, and thus acts as a reservoir, all infected and suspected animals should be treated once a week during the fly season (October to March).

It was realized that the demands made by the five injection method were heavy. To reduce this three doses were given progressing from 1 gramme to 1·5 and then 2, and this was found to be satisfactory.

Injections of tartar emetic may cause alarming symptoms, but in only 9 cases out of 705 did these appear during the author's work. He believes that the symptoms are due to the toxic action of the drug and not to the destruction of the trypanosomes by the drug with the liberation of toxin. Tolerance is rapidly established, however, as a double dose on the day following the first injection is borne with impunity.

In cases of nagana caused by *T. congolense* the effect of the drug was to clear the circulation of trypanosomes in periods ranging up to 1½ hours. The periods for which the circulation remained free ranged from 6 to 414 days, but as the animals were grazed on the confines of fly country it is impossible to say whether the reappearances were due to relapses or re-infections. From a tabular statement it appears that there is no direct relationship between the number of doses given and the interval of freedom from parasites in the blood, but field experience tended to show that recovery was hastened and relapses were less likely to occur when a succession of larger doses was given. It was thought that the trypanosomes became drug-fast more readily when small doses were given and also that large doses decreased the virulence of the strain. As in other diseases, the occurrence of relapses was associated with meteorological conditions.

The author draws special attention to the development of lesions of the eyes as an aid to diagnosis. These range from photophobia and lachrymation to opacities of the cornea and actual ulceration. Under treatment these lesions rapidly clear up. Ocular lesions are more serious in *T. brucei* infections than in *T. congolense* infections.

It is estimated that during 1920 approximately 33 per cent. of the cattle died of nagana, and that over 90 per cent. of those infected died. In the following year about 25 per cent. of the animal population died. During 1922, when the issue of tartar emetic to farmers was in full swing, it was calculated that the losses fell to about 5 per cent., and that only 20 per cent. of these infected died. It is admitted that these figures are approximate only.

DAHMEN (H.). **Zur Chemotherapie der Beschälseuche.** [The Medicinal Treatment of Dourine.]—*Berlin Tierärzt. Woch.* 1926. Feb. 5. Vol. 42. No. 6. pp. 85–89.

The author cannot recommend neosalvarsan for the treatment of dourine because in some cases it appears to exert no influence at all, and in others it does not prevent clinical and serological relapses occurring.

Relapse, wasting and abortion followed the use of silver-salvarsan.

More satisfactory results were obtained with neo-silver-salvarsan, but in view of the small number of cases (17) in which it was used, and in view also of the fact that some of the animals treated had previously been treated unsuccessfully with other drugs, a definite opinion of its value cannot be formed.

In 4 out of 10 cases treated with " Bayer 205 " clinical relapses were observed, and in two others relapses were detected by serological means.

Attention is drawn to the fact that in estimating the value of a method of treatment the possibility of natural recovery must not be lost sight of.

LECKIE (V. C.). **Some Notes on Surra in the Camel, its Prevention and Treatment.**— *Vet. Jl.* 1925. June. Vol. 81. No. 6. pp. 281–292; July. No. 7. pp. 346–352; Aug. No. 8. pp. 398–404; Oct. No. 9. pp. 494–499; Nov. No. 10. pp. 546–553.

The paper contains the author's observations and experiences during a period of two years.

The publication of the " notes " was prompted by the variations encountered by less experienced people in the results of treatment along the lines suggested by CROSS, namely, the repeated intravenous injection.

Leckie suggests the classification of surra under three heads : Acute, sub-acute, and chronic, and he tabulates the classifications in the following way :—

Acute.	*Sub-acute.*	*Chronic.*
Lasting 3–6 months ...	Beginning 4–6 months after the first attack and lasting up to two years.	Beginning in some cases a year after the first attack and lasting about three years.
Trypanosomes appear in the blood three or four times a month.	Trypanosomes appear in the blood once or twice a month.	Trypanosomes appear in the blood once in six months or once a year.
Most dangerous stage...	Not fit for work ...	Fit for work except during paroxysms of fever.

In addition to the usual symptoms associated with the acute and sub-acute type of the disease, the author notes that camels sometimes show great restlessness, acceleration of respiration, frothing at the mouth, and, if tied down, violent struggling. A free animal may gallop until it falls exhausted, and in such cases death generally takes place.

In the chronic stage the appearance of the camel varies very greatly with the manner in which it is looked after. Animals that are well fed and lightly worked may present no clinical evidence of infection at all. If not well looked after general loss of condition and enlargement of the superficial glands are observed. There is little or no direct evidence regarding the transmission of surra from camel to camel, but it is significant that if camels are kept away from areas infested by Tabanidae the incidence of the disease is materially reduced.

From experiments it would appear that an interruption of feed is necessary for the transmission of surra, that is to say, a fly feeding on

an infected animal must be disturbed and transfer itself to a healthy camel for the infection of the latter. After a full meal on an infected camel the fly digests the blood and is not infective when it bites again. The possibility, however, is not excluded that such a fly might become infective again after an interval.

Leckie draws special attention to the possibility of transmitting the disease to healthy camels through carelessness in making routine blood examinations of a number of animals.

The author describes in detail the whole of the apparatus necessary for the preparation and use of a solution of tartar emetic by intravenous injection. The drug is used at 1 per cent. strength in distilled water injected at body temperature. Before and after the introduction of the tartar emetic solution into the vein a quantity of 1 per cent. salt solution is introduced. From a tabular statement given it appears that 50 cc. of salt solution are used for this purpose, divided into two lots of 25 cc. each.

The needle is sterilized between injections by placing it in methyl alcohol.

In the early stages of treatment the camel has two adverse influences to contend with: (1) Surra toxaemia; and (2) poisoning by the drug. As condition improves tolerance of the drug becomes greater, and in this lies the necessity of very gradual increase in the dosage. Careful watch must be kept on camels under treatment as a certain proportion of animals, and sometimes a large proportion, will become "sick" during treatment. To push treatment when this occurs almost certainly means death. Animals showing symptoms of poisoning have administered to them magnesium sulphate in doses of 2 to 4 lb. in several gallons of water. This may have to be repeated. Temperatures must be taken daily as a rise to 100° F. from the average mean of 98° F. is usually the first symptom of poisoning. The train of symptoms following an overdose is cessation of rumination, loss of appetite, orange-coloured or blood-tinged urine, yellow discolouration of the mucous membranes, lachrymation, dermatitis, constipation, paraplegia and muscle tremors, and disorganization of the eyes. In connexion with the passage of coloured urine, it is noted that camels which have browsed on "pipal," one of the Indian fig trees, pass urine the colour of red ink.

A standard treatment which yielded 95 per cent. of cures was as follows:—

1st day	20 cc. ½ per cent. solution.
2nd and 3rd days...	20 cc. 1 per cent. solution.
5th, 7th and 9th days	50 cc. 1 per cent. solution.
11th, 13th and 15th days ...	100 cc. 1 per cent. solution.

On every other day from the 17th to the 35th 150 cc. of 1 per cent. solution.

37th, 39th and 41st days ...	175 cc. of 1 per cent. solution.
43rd, 45th, 47th and 49th days...	200 cc. of 1 per cent. solution.

It may be necessary to discontinue treatment for a time if poisoning occurs. The total amount of tartar emetic given is about 30 grammes. In some cases as much as 40 grammes in all have been given. It is said that if re-infection occurs after cure, larger doses may be given as tolerance has been established.

Treatment should not be begun while trypanosomes are demonstrable in the blood, for "fainting" is likely to occur. The post-mortem findings in an animal dying under treatment are: Yellow staining

of the tissues. Fatty degeneration of the heart. Spleen slightly enlarged and flaccid. The liver is enlarged and pale in colour with a tendency to a greenish tint. On section the cut surface is bright orange in colour. The parenchyma is readily broken down with the fingers. The kidneys show fatty degeneration. Care must be exercised in the general management of camels under treatment, special attention being paid to the question of suitable food. Digestive disturbances are likely to occur, and a ration of salt helps to overcome this. Some camels apparently cured again fall sick with surra after their return to their owners. These may be relapses, but the possibility is not excluded that they are actual re-infections. Experiments have been made with sodium antimony tartrate in place of the potassium salt. It is said to offer the following advantages : It is less depressing and may be given in larger doses ; it clears the circulation of trypanosomes very rapidly ; general improvements in health and condition are noted during treatment. While camels appear to be more tolerant of the sodium salt than of the potassium salt, the same care must be exercised in carrying out the treatment.

The treatment has not been under test sufficiently long to warrant conclusions, but it promises well. It has been found that infected camels not showing trypanosomes in their blood may with safety be given an initial dose of 200 cc. of a 1 per cent. solution of the sodium salt.

The effect of the drugs on the trypanosomes was studied in moist and stained preparation at definite intervals (10 minutes) after injection of the drugs. The first indication of action is that the cytoplasm stains faintly. This is followed by a disappearance of the centrosome and flagellum and finally disintegration of the nucleus.

The author describes two forms of trypanosome in camels, a long slender form with a pointed posterior extremity and a shorter broad form with a blunt posterior end, and suggests that the slender forms result from binary division, and then become changed into the broad forms.

DESCHIENS (R.). *Giardia cati* **R. Deschiens, 1925, du chat domestique** (*Felis domestica*). [*Giardia cati* of the Domestic Cat.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 33–48.

As the result of the comparison of measurements the author comes to the conclusion that *Giardia cati* and *Giardia felis*, Hegner, are identical species. He distinguishes three types based upon certain measurements.

Experimentally it was found impossible to infect two guineapigs, two mice, and a puppy by feeding them with cysts. It is therefore concluded that the organism is specific for the cat.

TANABE (M.). **The Cultivation of Trichomonads from Man, Rat and Owl.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 101–104.

The culture medium used has the following composition :—

Sodium chloride	0·7 g.
Sodium citrate	1·0 g.
Löffler's blood serum (dehydrated)	0·5 g.
White of egg	2 cc.
Distilled water	100 cc.

The substances are added to the water in the order given, with vigorous shaking. The reaction is adjusted to pH 8 to 8·2. Cultures were incubated at 35° C.

MAGNEVILLE (A.). **Un cas de theilériose bovine congénitale.** [A Case of Congenital Bovine Theileriasis.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 721–722.

A calf, a week old, had appeared perfectly well at 11 a.m., but at 2 p.m. it was seen to be in a fit, with muscular spasms, nystagmus and coma. The mucous membranes were very pale. Slight stimuli precipitated further muscular contractions. There was great acceleration of the pulse. Death occurred in a fit of great violence about an hour or so later.

The post-mortem examination was made at once. The liver was yellow and showed a number of infarcts. The spleen was enlarged and softened. The mucous membrane of the abomasum showed lenticular ecchymoses.

Material was sent to the Pasteur Institute, Algiers, and a diagnosis of theileriasis was made. In the pulp of the solid organs schizonts and gamonts were found.

According to the owner the dam had shown no signs of infection, but in view of the facts revealed by the post-mortem and microscopic examination it must be admitted that the infection had been present for some days, and must therefore have been contracted in utero.

Theileriasis was known to be in existence on the farm.

YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **Contribution a l'étude des piroplasmoses bovines en Russie.** [Bovine Piroplasmosis in Russia.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Jan. 30. Vol. 97. No. 2-3. pp. 192–210. With 1 plate & 5 text figs.

The authors find that two types of piroplasmoses occur in bovines in Russia: In the south the parasite closely resembles *B. bigeminum*, and in the north-west, *B. bovis*.

PÉRARD (Ch.). **Recherches sur les coccidies et les coccidioses du lapin.** [Coccidiosis in the Rabbit.]—*Ann. Inst. Pasteur.* 1925. Dec. Vol. 39. No. 12. pp. 952–961. With 3 text figs.

The investigations recorded here had for their object the study of the schizogonous cycle of development. The author subdivides the parasite occurring in the intestine into two species, *Eimeria perforans* and *E. magna*, the latter being so named on account of its size.

In order to obtain specimens showing schizogony rabbits should be killed on the 7th to 12th day after feeding in the case of *E. stiedae*, and on the 3rd to the 5th day in the case of the intestinal species.

At these stages macroscopic lesions are not very marked.

In scrapings from the invaded bile ducts schizonts and merozoites are plentiful.

The number of merozoites in a schizont may range from 2 to 30, but in the great majority of parasites the figure lies between 6 and 10. At one pole of the organism there is a residual body, which has little affinity for nuclear strains. The individual merozoites are from 8 to 10μ long by 1·5 to 2μ in diameter. The nucleus shows a large vacuole containing a caryosome and the cytoplasm is free from granules

Exceptionally, one may find a parasite developing in a liver cell instead of in the epithelium of the bile ducts. In lesions of the intestine caused by *E. perforans*, it is a striking feature of the picture presented by any one part of a lesion that all the parasites present are in approximately the same stage of development.

The merozoites developed from schizonts in the case of this parasite are longer and more slender than those of *E. stiedae*. They measure 10–12μ by 0·5 to 0·75μ. As a rule, about 40 merozoites are formed from a single schizont, but the number may be as high as 70. Their bodies contain a row of granules which stain with nuclear dyes. There is also a residual body at one pole which has similar staining reactions.

In the case of *E. magna* the schizonts range in size from 10–25μ. The merozoites have one rounded end and one pointed, and range from 4–10μ in length by 1 to 2·5μ in thickness. They may number from 2 to 50 in a single schizont. The measurements are all taken from specimens in sections of fixed tissues. In the case of this parasite the author states that schizonts may be found developing within cells of the connective tissue of the villi beneath the epithelial layer, and this not rarely.

The author holds that the developmental phases of *E. magna* make it certain that it is a species distinct from *E. perforans* and *E. stiedae*.

HENRY (A.) & LEBLOIS (Ch.). **Essai de classification des coccidies de la famille des *Diplosporidae* Léger 1911.** [The Classification of the Coccidia belonging to the Family *Diplosporidae* Léger 1911.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 22–28. With 6 text figs.

The authors suggest that the parasites hitherto grouped as Isospora can in reality be subdivided into four groups depending upon: (1) The form of the sporocysts; and (2) the disposition of the sporozoites within these. One group—*Isospora*—has its four sporozoites in each sporocyst lying in the same direction. The second—*Diplospora*—has the sporozoites in pairs, the individuals of each pair lying head to tail. These two groups have pyriform sporocysts. The other two groups have oval or fusiform sporocysts. These are *Lucetina*, in which the sporozoites lie in the same direction, and *Hyaloklossia*, in which they are in pairs, but crossed.

The types of the classification are given as follows:—

Pyriform sporocysts	...	*Isospora rara.* *Diplospora avium.*
Oval Sporocysts	...	*Lucetina rivoltai.* *Hyaloklossia lieberkühni.*

DOBELL (Clifford). **On the Species of *Isospora* parasitic in Man.**—*Parasitology.* 1926. Jan. Vol. 18. No. 1. pp. 74–85.

This paper is a criticism of WENYON's paper on "Coccidiosis of Cats and Dogs and the Status of the Isospora of Man" (this *Bulletin*, Vol. 11, p. 120).

ADIE (Helen). **Nouvelles recherches sur la sporogonie de *Haemoproteus columbae*.** [Fresh Researches on the Sporogony of *H. columbae*.]—*Arch. Inst. Pasteur Algérie.* 1925. Vol. 3. No. 1. pp. 9–15. With 2 plates & 5 text figs.

The author repeated the work carried out in India and published in 1915 in part for the purpose of drawing attention to the fact that in

some recent editions of text books the original diagrammatic representation of the life cycle of the parasite published by BEAUREPAIRE-ARACAO in 1907 is reproduced without alteration. She has, in addition, been able to demonstrate the sporozoite of the parasite, the stage which is responsible for the infection of birds, in the pigeon fly. In fact, the cycle of development runs parallel with that of the malarial parasite of man.

In studying the phases of development in the pigeon fly the author has infected these by feeding them on birds suffering from a primary attack, and has then continued the feeding on very young birds which could not possibly have been infected. This was necessary for the reason that if infected blood is constantly used for the nourishment of the flies all stages of development may appear at one and the same time in the fly.

It requires about 9 days for an oocyst to become mature in the stomach wall of the fly, and at this stage the parasite measures about 36μ in diameter.

At the 10th to 12th day the liberated sporozoites invade the salivary apparatus. These are sickle-shaped bodies measuring 7–10μ in length and having a nucleus which is a little nearer the anterior than the posterior end.

MARTIN (M. A.). **Sur quelques "Enterites à Protozoairés" du chien et du chat.** [Protozoal Enteritis of the Dog and Cat.]—*Rev. Vét.* 1926. Jan. Vol. 78. No. 1. pp. 5–18.

Little is known regarding the pathogenic rôle played by the Giardia parasites of the cat and dog. It is possible, but by no means certain, that the species parasitizing these animals are distinct both from each other and from parasites of the same genus in other animals and in man. Statistics regarding the frequence of occurrence are not available. Existing knowledge would appear to indicate that in animals the parasites are not responsible for the severe enteritis caused in man, and carriers in apparent perfect health are not uncommonly met with.

Amoebic dysentery occurs both in dogs and cats, but more rarely in the latter species, and in these animals the disease closely resembles the corresponding condition in man. It appears to be not improbable that the amoebae of man and the carnivora are identical, but medical opinion at the present time is that human beings contract the infection from others of their race and not from the lower animals. Spirochaetal infections occur in dogs and cats, and the view has received some support that parasites of this genus are responsible for gastro-enteritis (Stuttgart disease) in dogs.

KLIGLER (I. J.). **The Cultural and Serological Relationship of** *Leishmania.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Nov. & Dec. Vol. 19. Nos. 5-6. pp. 330–335.

Technique.—Cultures were maintained on 0·2 per cent. nutrient agar containing 0·1 per cent. of dextrose and 10 per cent. of fresh rabbit

serum. The stock semi-solid agar is prepared by adding one part of standard dextrose agar to nine parts of normal saline. The rabbit serum is added to the melted agar just before use.

In this medium the flagellates grow in the upper part of the medium, and after about a week there is a greyish mass at the top 3–5 mm. thick, which swarms with them. For fermentation reactions the medium described is used with the required carbohydrate in place of the dextrose. The presence or absence of fermentation was tested by taking the pH of the medium. Neutral red proved a satisfactory indicator because the acidity rarely rises above pH 6·0.

In testing the pH 1 cc. of the upper parts of a culture was mixed with 4 cc. of neutral distilled water, three drops of indicator were added, and the colour compared with standards in a comparator. Cultures showing little or no visible growth should not be used. Immune sera were prepared by inoculating rabbits at 3- to 5-day intervals with pooled cultures of the same strain in doses of 0·5 to 2·0 cc. The rabbits were bled 7 and 10 days after the last injection. In all cases sera which were potent in dilutions of 1 in 40 to 1 in 100 were obtained. The serum drawn at 10 days was more potent than that drawn at 7 days.

In devising a technique for agglutination tests the principal difficulties to be overcome were the interference of the agar and the tendency to spontaneous agglutination and sedimentation.

The former of these was avoided by growing the cultures on 1·5 per cent. agar slants to which 0·1 per cent. dextrose and 10 to 15 per cent. rabbit serum were added. A heavy suspension of young flagellates is inoculated into the water of condensation, and the tube slanted so that the entire surface is covered with the liquid. In 7 to 10 days a complete film covers the surface in good cultures.

The growth is washed off in saline and shaken up with beads. It is then allowed to stand to let the coarse particles settle and the supernatant suspension is used. If the suspension is made up in buffered solution to pH 7·0 it stands better than in saline.

Serum concentrations of 1 in 5, 1 in 10, etc., are used, and the tubes are incubated at 25° C. In higher concentrations sharper results are given because of the more prompt agglutination. This is readily distinguishable from spontaneous sedimentation.

The author also states that the following technique gives satisfactory results. Agar containing only 0·1 per cent. is used. The growth obtained after a week is suspended in salt solution, and this is added in equal amount to dilutions of the serum to be tested.

Six strains have been used in tests, as follows: One from an Aleppo boil, one from a Bagdad boil, one from a case in Palestine, and three old strains obtained from NOGUCHI—*L. tropica*, *L. infantum*, and *L. braziliensis*. *L. braziliensis* and *L. infantum* sera invariably agglutinated specific cultures only. Sera prepared from *L. tropica* failed to agglutinate *L. infantum* and *L. braziliensis*.

It had been observed in earlier work that specific sera in higher concentrations produced a lytic effect. This effect was found to be specific. It could be demonstrated by adding graded amounts of immune sera to the tubes of culture media. A concentration of immune serum above a certain point inhibited growth.

Attempts to work out the fermentation reactions of the organisms have not yielded satisfactory results up to the present, because only a small number of strains have been submitted to examination.

FUNAIOLI (Giulio). **La leismaniosi canina in Tripolitania.** [Canine Leishmaniasis in Tripoli.]—*Arch. Ital. Sci. Med. Colon.* 1925. Jan.–Feb.–Mar. Vol. 6. Nos. 1–2–3. pp. 12–14.

The author has examined smears from the liver and spleen of 177 dogs during the period August, 1922, to August, 1923, and has found two animals infected. He was not able to make preparations from the bone marrow.

DOGIEL (V.). **Une nouvelle espèce du genre** *Blepharocorys, B. bovis* **n. sp. habitant l'estomac du boeuf.** [A New Species of *Blepharocorys, B. bovis*, inhabiting the Stomach of the Ox.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 61–64. With 2 text figs.

The author describes the organism found in the rumen of cattle from various parts of Russia, and states that 25 per cent. of the animals harboured it.

From measurements it appears that the infusorian is smaller than any previously described.

The paper includes a key to the species already known.

DIOS (R. L.) & ZUCCARINI (J. A.). **Présence de Spirochètes dans le sang des chevaux en Argentine; première observation.** [Spirochaetes in the Blood of Horses in the Argentine.]—*C.R. Soc. Biol.* 1925. Dec. 11. Vol. 93. No. 36. p. 1457.

The authors have detected spirochaetes in the blood of horses which had been injected protectively against Mal de Caderas with " Bayer 205 " and sent into an infected area. They failed to transmit the parasite to sheep and goats by inoculation. Not all the animals which had received the protective treatment showed the parasite.

STYLAPANOPOULO (M.). **La spirochétose des poules en Grèce.** [Spirochaetosis of the Fowl in Greece.]—*Bull. Soc. Path. Exot.* 1925. Nov. Vol. 18. No. 9. pp. 701–702.

The author places on record the occurrence of spirochaetosis of poultry in the neighbourhood of Athens.

BOSSELUT (R.). **Sur un spirochète sanguicole du chien domestique.** [A Spirochaete in the Blood of a Dog.]—*Bull. Soc. Path. Exot.* 1925. Nov. Vol. 18. No. 9. pp. 702–704. With 1 text fig.

The author records the occurrence in Algeria of spirochaete infection in the blood of a dog. The diagnosis was made at the Pasteur Institute.

The parasites ranged from 8 to 22 μ long, and showed 3 to 6 irregular coils. There was marked anisocytosis and polychromatophilia, but no piroplasms were found.

An attempt was made to transmit the infection by inoculation, but a dog suitable for inoculation was only found six days after the parasites had been seen in the blood. The inoculation failed.

Systematic examinations of the blood of dogs in the same district since has not revealed any case of infection.

The author names the parasite *Spirochaeta canina*, n. sp.

PHISALIX (M.). *Cyclospora viperae*, **Coccidie parasite de l'intestin de la vipère aspic, infecte également nos autres serpents indigènes, et spécialement la Couleuvre d'Esculape et la Couleuvre de Montpellier.** [*Cyclospora viperae* infects also *Coluber esculapii* and *Coelopeltis monspassulana*.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 707–709.

DISEASES DUE TO METAZOAN PARASITES.

CHANDLER (Asa C.). **The Helminthic Parasites of Cats in Calcutta and the Relation of Cats to Human Helminthic Infections.**—*Indian Jl. Med. Res.* 1925. Oct. Vol. 13. No. 2. pp. 213–227. With 2 plates.

The following parasites have been found, and their percentage incidence in 250 cats is given :—

Trematodes—		
Opisthorchis felineus	61·0	per cent.
Echinochasmus perfoliatus	2·0	,,
Cestodes—		
Diphyllobothrium decipiens	0·5	,,
Taenia taeniaeformis	42·0	,,
Dipylidium caninum	43·0	,,
Nematodes—		
Strongyloides stercoralis felis	20·0	,,
Belascaris mystax	63·0	,,
Ancylostoma braziliense	70·0	,,
Gnathostoma spinigerum, from at different seasons.	0 to 31·4	,,
Physaloptera praeputialis	3·0	,,
Spirocerca felineus	2·0	,,
Acanthocephala—		
Centrorhynchus erraticus	0·5 (one case)	,,

Of these, *Spirocerca felineus* and *Centrorhynchus erraticus* are new species.

SMIT (H. J.). *Filaria spirovoluta* **Smit-Ihle. een nieuwe (?) filaria van het paard.** [*Filaria spirovoluta* Smit-Ihle. a New (?) Filaria from a Horse.]—*Nederl.-Indië Blad. v. Diergeneesk.* 1925. Dec. Vol. 37. No. 6. pp. 529–534.

The author describes a filaria found in the fibrous tissue beneath the deep pectoral muscle of a native pony. Three females only were found. They ranged from 95–132 mm. in length and were 272 μ thick. They appeared to be oviparous as well as ovoviviparous. The blood contained larvae measuring 160–190 μ by 3·3 μ.

It is suggested that the parasite is transmitted by blood-sucking flies.

Ross (I. Clunies). **A Note on the Occurrence of *Dirofilaria immitis* (Leidy) in the Dog in New South Wales.**—*Jl. Austral. Vet. Assoc.* 1925. Dec. Vol. 1. No. 4. pp. 94–95.

Ross records the discovery by Dodd of this parasite in the heart of a dog in Sydney. It has previously been encountered in the northern part of the State. The dog was two years old and had spent the last 18 months of its life in Sydney. Previously it had not been further north than Newcastle.

Sandground (J. H.). **Speciation and Specificity in the Nematode Genus Strongyloides.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 59–80. With 2 plates.

The erection of new species on the basis of morphological studies is weak. The range of variation is so great that few species can be definitely differentiated by these characters.

Specificity for hosts is regarded as the best means of determining specificity, but certain considerations must be observed in the interpretation of the results of infection experiments. From a morphological standpoint *S. ovocinctus* Ransom 1911 is questioned. *S. stercoralis* is held to be identical with the human parasite.

The parasite of the rat is differentiated from *S. papillosus* on morphological and biological grounds, and a new species *S. ratti* made.

A new species from *Hydrochoerus hydrochoera* is described, *Strongyloides chapini.*

Nicholls (L.) & Crawford (M.). **Verminous Ophthalmia of the Horse in Ceylon.**—*Ceylon Jl. Sci.* 1925. Nov. Vol. 1. No. 3. pp. 147–149. With 3 plates.

The authors give a brief account of the clinical symptoms caused by the presence of worm parasites in the anterior chamber of the eye in horses, but point out that occasionally cases are encountered in which the presence of the worm is not responsible for any symptoms. Descriptions are given of three nematodes extracted surgically from the eyes of horses.

1. A larval nematode (female) 3·4 centimetres in length by ·38 mm. at its greatest thickness. The oesophagus shows two distinct portions. The anterior measures ·6 mm. and the posterior 5·8 mm. The mouth is unarmed. The vulva opens ·6 mm. from the anterior end. There are two caudal papillae measuring ·015 mm. in length.

2. A male larva measuring 3·53 centimetres in length and ·34 mm. at its greatest thickness. The mouth is unarmed. The oesophagus is divided into two parts, the anterior of which measures ·6 mm. and the posterior ·9 mm. The excretory pore opens 0·3 mm. from the anterior end.

The caudal extremity is crescentic. There are 6 small papillae on the short margin of the crescent. The cloaca opens at the level of the 4th papilla.

3. Adult female nematode measuring 1·6 centimetre by ·37 mm. The cuticle is striated transversely throughout the length.

The mouth is large and armed with two chitinous plates. The anus is ·07 mm. from the posterior extremity. The ovaries are packed with eggs measuring $32 \times 28 \mu$. The two uteri unite and open through the vulva ·98 mm. from the anterior end.

WALTON (C. L.) & JONES (W. Norman). **The Control of Liver Fluke in Sheep.**—*Jl. Ministry Agricult.* 1925. Nov. Vol. 32. No. 8. pp. 686–693.

This paper contains a summary of the experiments carried out in North Wales prior to 1925 and an account of the work carried on during that year.

A severe outbreak occurred in 1920–21, and investigation showed that *Limnaea truncatula*, the host snail, was present in enormous numbers. Field experiments in June, October and November, 1921, showed that a 1 per cent. solution of sulphate of copper was valuable for killing off the snails, and that a dust of 1 part sulphate of copper and 2 parts china clay was also effective.

The hot dry summer of 1921 rendered work difficult, but the wet sunless summer of 1922 resulted in an increase in the snails. In December, 1922, and March, 1923, experiments were carried out for the purpose of testing sulphate of ammonia against sulphate of copper. The former failed completely while the latter yielded good results.

The wet years 1923–24 caused a recurrence of liver rot in many places, and during the winter 1924–25 further experiments were carried out with a view to simplifying and cheapening the process of snail destruction.

It is noted that the three species of Limnaea are known to occur in North Wales. *L. truncatula* is the most abundant. *L. peregra*, which is seldom found save in mud in ditches, has been definitely incriminated as a host. *L. palustris*, which has a localized distribution, has not been incriminated.

In the field experiments carried out in 1925 it was found that copper sulphate could be used successfully whether sprayed, dusted, or broadcast. Solutions of 2, 1 and ½ per cent., were all equally successful when used as a spray. If land is actually carrying standing water the stronger solutions should be used. On land that has become partially dried snails may remain alive unless there is thorough wetting of the surface. It will be seen that the amount of liquid required per acre must vary. On a plot carrying long herbage where the land was damp about 140 gallons per acre were required.

Dusting with the copper sulphate kaolin mixture is useful for ditches, margins of ponds, etc., but the action is slower, as it is dependent upon rain, and the risk to stock is greater. Animals should be kept off treated areas till the herbage has been washed clean by rain. The amount required is roughly 1¼ cwt. per acre.

By broadcast method 1 part of sulphate of copper to 4, and 1 to 8 of fine dry sand proved suitable for treating large swampy areas. Sulphate of iron and salt were not successful, and sulphate of ammonia was successful only at a prohibitive cost.

Cost. Spraying, excluding the cost of labour, works out at about 7s. 6d. per acre.

Dusting costs about 12s. 6d. per acre (excluding labour).

Broadcasting, 10s. per acre, with the cost of sand and labour in addition.

HENRY (A.), LEBLOIS (Ch.) & DERVAUX (P.). **Echinococcose péritonéale chez un chat.** [Peritoneal Echinococcosis in a Cat.]—*C. R. Soc. Biol.* 1925. Dec. Vol. 93. No. 37. pp. 1470–1471.

The cat was thought to be suffering from Ascites as it abdomen was enormously enlarged and actually touched the ground.

On post-mortem examination an enormous number of echinococcus cysts escaped. The whole of the peritoneum was covered with cysts. There were no parasites in the substance of the liver, spleen or lungs. The right kidney could not be found and the suggestion is put forward that the immense invasion of the peritoneum was secondary to a primary infestation of this organ.

SKRIABINE (K. I.) & SCHULZ (R. Ed.). **Affinités entre le *Dithyridium* des souris et le *Mesocestoides lineatus* (Goeze, 1782) des carnivores.** [The Relationship between *Dithyridium* of the Mouse and *Mesocestoides lineatus* (Goeze), of Carnivora.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 68–73. With 3 text figs.

The authors state that Dithyridium of the abdominal cavity of rats and mice represents the larval form of *Mesocestoides lineatus*, and that these animals must therefore be considered the intermediate hosts of the mature parasite of the small intestine of cats, dogs, and other carnivora.

The hypothesis put forward by ALESSANDRINI that the larval form of this parasite occurs in the serous cavities of birds must be abandoned.

CURASSON (G.). *Ctenocephalus canis* **parasite du mouton.** [*Ctenocephalus canis* occurring as a Parasite of the Sheep.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 755–756.

It is generally held that sheep do not harbour fleas, possibly on account of suffocation by the grease in the fleece. Whatever the reason, it is a fact that fleas do not occur frequently as parasites of the sheep.

For this reason the author places on record the occurrence of infestation of sheep, an infestation which is sometimes serious, in the Macina area.

The parasite is *Ctenocephalus canis*, and it is found during the cold weather. Young animals are mostly attacked, and the lower parts of the limbs which are devoid of wool may be literally covered with fleas. Among indigenous lambs, which have a more open fleece, the whole of the body may be invaded. In cross bred indigenous-merino animals invasion of the body is less pronounced.

Severe losses may result from loss of blood and constant irritation.

GIRARD (G.) & LEGENDRE (F.). **Premières observations sur les puces de rat des régions pesteuses de Madagascar.** [Preliminary Observations on Rat Fleas from Plague Areas in Madagascar.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 730–731.

All the rats examined belonged to the species *M. rattus* var. *alexandrinus*.

The following fleas were found out of 1,675 examined :—

Xenopsylla cheopis	60 per cent.
Ctenopsylla musculi	25 per cent.
Sarcopsylla (*Echidnophaga*) *gallinacea*	15 per cent.

SÉGUY (E.) **Etude sur quelques Muscides exotiques à larves parasites.** [Exotic Muscidae the Larvae of which are Parasitic.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 732–735.

The author gives a list of 18 genera of flies the larvae of which are parasitic or sarcophagous.

DE BLIECK (L.) & BAUDET (E. A. R. F.). **Contribution à l'étude du développement des Strongylidés (Sclérostomes) du gros intestin chez le cheval.** [The Development of the Strongyles of the Large Intestine of the Horse.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 87–96.

BOULENGER (C. L.). **Report on a Collection of Parasitic Nematodes, mainly from Egypt. Part IV. Trichostrongylidae and Strongylidae.**—*Parasit.* 1926. Jan. Vol. 18. No. 1. pp. 86–100. With 28 text figs.

FAUST (E. C.). **Further Observations on South African Larval Trematodes.**—*Parasit.* 1926. Jan. Vol. 18. No. 1. pp. 101–126. With 2 plates & 1 text fig.

HOEPPLI (R. J. C.). *Mesocestoides corti,* **A New Species of Cestode from the Mouse.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 91–96. With 1 plate.

MACCALLUM (G. A.). **Revue du Genre** *Spirorchis* **MacCallum.** [A Review of the Genus *Spirorchis.*]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 97–103. With 5 text figs.

NEVEU-LEMAIRE (M.). **Le Femelle de** *Buissonia longibursa* **Neveu-Lemaire Parasite du rhinocéros africain (Rhinoceros bicornis).** [The Female of *Buissonia longibursa* Neveu-Lemaire of the African Rhinoceros.]—*Ibid.* pp. 85–86. With 1 plate.

ORTLEPP (R. J.). **On Two Nematode Parasites from the Gizzard of Pea-Fowls.**—*Jl. Helminth.* 1925. Dec. Vol. 3. No. 5. pp. 177–184. With 7 text figs.

PRICE (E. W.). **The Occurrence and Distribution of** *Cysticercus cellulosae* **in Texas Swine.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 81–82. With 1 map.

RANSOM (B. H.). **Hookworms of the Genus Uncinaria of the Dog, Fox and Badger.**—*Proc. U.S. Nat. Museum. 1924.* Vol. 65. Article 20. pp. 1–5. With 1 plate.

SENEVET (G.). **Description des nymphes de** *Rhipicephalus bursa* **et de** *Hyalomma lusitanicum* **avec un tableau pour la détermination des nymphes des Ixodidés algériens.** [Description of the Nymphs of *Rhipicephalus bursa* and *Hyalomma lusitanicum,* with a Key to the Nymphs of the Ixodidae of Algeria.]—*Arch. Inst. Past. Algérie.* 1925. Vol. 3. No. 1. pp. 59–63.

STILES (C. W.) & ORLEMAN (M.). **La nomenclature des genres de cestodes** *Raillietina, Ransomia,* **et** *Johnstonia.* [The Nomenclature of the Genera of Cestodes *Raillietina, Ransomia,* and *Johnstonia.*]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 65–67.

STEKHOVEN (J. H. S.). **Studies on** *Hippobosca maculata* **Leach and** *H. equina* **L. in the Dutch East Indian Archipelago.**—*Parasit.* 1926. Jan. Vol. 18. No. 1. pp. 35–50. With 1 plate, 1 map, & 5 text figs.

WARBURTON (C.). **On Three New Species of Ticks (Arachnida, Ixodoidea),** *Ornithodorus gurneyi, Ixodes arvicolae* **and** *Haemaphysalis mjöbergi.*—*Ibid.* pp. 55–58. With 3 text figs.

BACTERIAL DISEASES.

VALLÉE (H.) & RINJARD (P.). **Études sur l'entérite paratuberculeuse des bovidés.** [Johne's Disease.]—*Rev. Gen. Méd. Vét.* 1926. Jan. 15. Vol. 35. No. 409. pp. 1–9.

This is a preliminary note regarding a possible method of protecting cattle against Johne's disease. The theory that forms the basis of

the method is that animals suffering from chronic infections cannot be super-infected.

The available evidence goes to show that subcutaneous inoculation of animals with cultures of the bacillus of Johne's disease fails to cause infection.

With the object of producing a persistent local infection with the bacillus the authors have adopted the plan devised by CALMETTE in connexion with the tubercle bacillus of injecting certain weighed quantities of culture with sterile paraffin, and the result of such injection is to produce after a lapse of some 48 hours a hot painful swelling about 5–7 cms. in diameter. There is no febrile reaction. In the course of a few days the acute inflammatory symptoms subside and there is left a hard painless swelling about half this size. These bosselated fibrous lesions are very persistent, and they have been observed to persist for as much as two years without change. The duration of their persistence is not yet known. In no case has there been observed any softening, or breaking down of the tissues with expulsion of the contents of the nodules. Nor has there been found in any such inoculated animal when submitted to post-mortem examination any evidence of extension of the infection.

The local lesions when examined post-mortem are found to comprise a central cavity containing an oily substance, which is the original excipient, around which are grouped clusters of small nodules about the size of peas. These are embedded in fibrous tissue and have all undergone caseation. The whole lesion is surrounded by fibrous tissue which is adherent to the skin and the underlying muscles and which isolates it from the rest of the tissues.

Guineapigs and cattle are quite unaffected by inoculation with the caseous material.

Observation on animals at the laboratory indicated that the inoculation was quite harmless.

As it is impossible to produce Johne's disease as it occurs naturally by experimental means, the value of the method has to be tested in the field.

Up to the present the authors have had 277 apparently healthy animals placed at their disposal for field tests. About one-third of these have been kept uninoculated as controls.

Full details of these tests are promised in a later communication. The authors content themselves for the time being by stating that they have grounds for considering the method of protective inoculation promising. On one farm where three cases have occurred among the controls none of the inoculated animals have developed the disease. On another farm where controls have become infected one animal among those inoculated has been slaughtered on account of infection. This animal, however, showed no inoculation nodule at the time of death. The authors state that this may have burst or have been absorbed, or it is possible that owing to an error the animal actually escaped the inoculation.

With regard to the suppuration of inoculation lesions, the authors note that there is a tendency for this to occur when animals already infected are inoculated. Inoculated animals react to a test material prepared from Johne's bacillus (using *B. phlei* and not tubercle bacilli for the preparation of the media) but not to tuberculin.

MORIN (H.) & VALTIS (J.). **Sur la filtration du Bacille de Johne à travers les bougies Chamberland L2.** [The Filtration of the Bacillus of Johne's Disease through Chamberland L2 Filters.] —*C.R. Soc. Biol.* 1926. Jan. 15. Vol. 94. No. 1. pp. 39–40.

In experiments reported by BOQUET the intraperitoneal inoculation of rats with Johne's bacillus produced minute tubercles on the peritoneum and epiploon in which the bacillus could be found in large numbers, and they could also be found in the enlarged bronchial glands.

The authors have inoculated rats with filtrate of suspensions of the bacillus in salt solution which had been passed through filters found to be capable of arresting the bacillus of fowl cholera. No visible lesions were produced in any, but acid fast bacilli could readily be found in smears from the omentum, liver, spleen and bronchial glands of some of them.

MORIN (H. G. S.). **Premières lésions viscérales déterminées chez le rat par l'inoculation de Bacille de Johne.** [Visceral Lesions in a Rat inoculated with Johne's Bacillus.]—*C.R. Soc. Biol.* 1925. Dec. Vol. 93. No. 38. pp. 1573–1574.

The author confirms BOQUET's observation.

BASSET (J.). **Immunisation des bovidés par la toxine symptomatique.** [The Immunization of Bovines with Blackquarter Toxin.]—*Rev. Vét.* 1926. Jan. & Feb. Vol. 78. Nos. 1 & 2. pp. 18–34, & 80–102.

The toxin was prepared by growing *B. chauvaei* in serum-liver-broth. There was abundant effusion of gas and the turbidity produced began to clear on the third day. The culture was filtered through a Chamberland F filter and the pH of the filtrate was found to be 5·5, as against the original pH of the broth of 7·04. Filtrate used immediately after preparation. The cultures were incubated for 2 days and then filtered (A). Doses of 15–25 cc. intraperitoneally killed guineapigs in 10 to 25 hours. Doses of 3–5 cc. subcutaneously caused local lesions which terminated in scar formation.

When the cultures were incubated for 5 days similar results were obtained, but the lesions following subcutaneous inoculation were more pronounced (B). Toxin which had been obtained from cultures incubated for 5 days but which were kept unfiltered for a month before they were used produced similar results (C).

Similar tests were carried out with the toxins prepared in these three ways after they had been kept in the dark and in sealed vessels for from 2 to 6 months. There was no difference in the results obtained with the first two, but there was some loss of toxicity with that which had been kept for a month before filtration.

Guineapigs inoculated subcutaneously with 5 cc. of toxins B and C were tested at 12, 20, 30 and 60 days with virulent culture which proved fatal for controls, and all survived. In some individuals a local lesion developed, but healing occurred. Guineapigs tested 7 days after inoculation with the filtrates were found to possess a less

solid immunity. Toxins B and C used two months after preparation possessed the same immunizing powers as the freshly prepared toxines. After four months 5 out of 18 guineapigs died when tested with virus.

Toxin C at 6 months failed to confer protection on the majority of the guineapigs.

When two injections of toxins B or C were given at intervals of a fortnight to a month all the animals resisted several lethal doses of virulent culture when tested at 12 days.

In a small number of experiments with bovines the author found that 10 cc. of toxin protected against a dose of virus which was fatal to controls in 2 days.

A recently prepared toxin when heated to 60° C. for an hour in a water bath was found to have lost all power of immunizing. During the heating a fine precipitate formed. This neither provoked lesions nor set up immunity.

The treatment of toxin by formalin in the proportion of ·5 per cent. with incubation at body temperature for a month results in the production of an anatoxin whether the liquid be exposed to the air or covered with paraffin. This could be injected subcutaneously in doses of 5 cc., with the production of a local lesion in a proportion of cases only.

After the lapse of a week these animals were found to have no immunity, but when an interval of 12 days was allowed to elapse rather more than 50 per cent. of the animals survived, although they developed large local lesions.

Heated (60° C.) anatoxin possessed the same properties as unheated, thus differing from the toxin.

The results, however, showed that anatoxin was not so satisfactory as the filtrate (toxin) for the production of immunity.

In about 70 per cent. of the guineapigs dead of blackquarter the gastric mucous membrane was closely beset with small ulcers and as the result of post-mortem examinations made upon animals just prior to death the author comes to the conclusion that this ulceration takes place very rapidly just before death occurs.

He states that this lesion is of very frequent occurrence in other diseases, having observed it in "gangrenous septicaemia, anthrax, pasteurellosis, paratyphoid, and tuberculous septicaemia." They are identical with those described in connexion with cattle plague and theileriasis.

As the result of experiments carried out on guineapigs and cattle Basset draws the following conclusions :—

Filtrate retains its properties for about four months. It is capable of conferring a solid immunity without exposing animals to any risk. The existence of some degree of immunity is recognizable a week after injection, but full immunity is not established until about the 12th day.

That it is possible to get a stronger immunity is suggested by Basset's recommendation that two injections should be given at an interval of "several" weeks. Animals so treated will resist "several" fatal doses.

The use of toxin alone has the advantage over virus vaccines in that it does not set up the disease in animals that are in a state of latent infection.

Formalin is said to reduce the immunizing properties of the filtrate considerably.

LOPEZ (C. L.). **Ampliación de las anatoxinas. Valor immunizante de los cultivos de** *Bacillus chauvoei* **estériles por el formol.** [Anatoxins. The Protective Properties of Cultures of the Blackquarter Bacillus rendered Sterile by means of Formol.]—*Revist. Hyg. y. Sanidad Pecuarias.* 1926. Jan. Vol. 16. No. 1. pp. 1–5.

The author finds formalin the best agent for sterilising cultures of *B. chauvoei* for the purpose of preparing a vaccine.

MORITA (H.). **An Experimental Study on the Pathology of the Black-leg.**—*Scientific Reports from Govt. Inst. Infect. Dis.* Tokyo. 1924. Vol. 3. pp. 97–102. With 9 figs. on 2 plates.

This is a very brief contribution to the subject and contains nothing of special importance.

STAUB (A.). **Quatre années de vaccination contre le choléra des poules.** [Four Years of Vaccination against Fowl Cholera.]—*Ann. Inst. Pasteur.* 1925. Dec. Vol. 39. No. 12. pp. 962–967.

Vaccination of fowls against fowl cholera had not been practised for some time in France on account of the infrequence of occurrence of the disease. The Pasteur Institute had, in fact, given up making the vaccines.

Shortly after the war extensive outbreaks occurred as the result of the importation of birds from German sources.

As it was impossible to prepare vaccines in a less period than some months, the author decided to try the use of a pasteurella derived from a rabbit. This organism, he states, is innocuous for fowls.

As some ampoules of culture were available, the virulence of the organism was restored by passage through guineapigs inoculated intraperitoneally. It was then tested on fowls and found to be harmless, and used as vaccine.

Reports are quoted which show that not only did the vaccine protect healthy birds, but that in some cases birds which were actually ill recovered. In all the cases quoted the cause of death was confirmed at the laboratory as fowl cholera.

Similar results were not obtained, however, in laboratory experiments, and the author explains the difference on the ground that natural infection does not take place in the same way as infection by inoculation. The uncertainty of transmitting the disease by ingestion is known, and the author attempted to get over this difficulty by feeding birds with the contents of the intestine of birds killed by inoculation. He found that he could readily kill the first bird of a series in this way, but that the second failed to become either infected or immunized.

The manner in which epidemics spread among birds, and the persistence of infection in farmyards are therefore matters which are difficult of explanation.

The view favoured by the author is that carriers exist.

In some instances deaths occurred after a lapse of some months after vaccination with the rabbit strain of organism.

An attempt was made to attenuate the strain in the classical manner, but the author notes that caution must be exercised in using attenuated

vaccines as in one case after the virulence had been reduced to a point of safety by prolonged incubation, it became exalted again, or at least it proved fatal in 33 per cent. of birds inoculated with it. The author suggests that certain organisms in the culture had retained their original virulence.

BRIDRÉ (J.) & DONATIEN (A.). **Le microbe de l'agalaxie contagieuse du mouton et de la chèvre.** [The Organism of Contagious Agalaxia in the Sheep and Goat.]—*Ann. Inst. Pasteur.* 1925. Dec. Vol. 39. No. 12. pp. 925–951.

The first record of the occurrence of this disease outside Europe appears to be that made by SERGENT and ROIG, who detected it in Algeria in 1908.

It again made its appearance in 1923 in some sheep purchased by the Pasteur Institute, Algiers, and it is from these cases that the authors have succeeded in isolating and cultivating a filterable but visible organism.

They have cultivated the organism in mutton broth plus horse serum, and have produced arthritis and mammitis in animals by inoculation.

The best medium for cultivating the organism, which is present in the inflammatory exudate of affected joints and in the mammary gland, is broth containing 5 to 10 per cent. serum. It appears to be immaterial what serum is used, but too high a proportion inhibits growth.

The majority of sugars retard growth slightly, but lactose and mannite favour it.

In serum broth tubes incubated at 37° C. a very faint turbidity makes its appearance after 3 or 4 days. This increases and after a few days a sediment forms and the liquid becomes clear.

With repeated subcultivation in the same medium growth becomes more rapid and more abundant. Exactly similar results are obtained under anaerobic conditions.

On the surface of serum agar minute colonies which are almost invisible to the naked eye make their appearance in three or four days. These eventually attain a diameter of 1 mm. They adhere firmly to the medium, and under a low power are seen to have an opaque raised centre with a thin transparent margin. Giemsa is the best stain for demonstrating the morphology of the organism. The short forms are vibrio-like and measure 2–5 μ in length. Longer spirochaete-like forms measuring up to 15 μ are found in cultures. Some individuals appear to have a deeply-stained granule at one end, while others appear to be granular throughout their length. In fact, the authors state, the morphological details are exactly those of the pleuropneumonia virus as described by BORREL, DUJARDIN-BEAUMETZ, and others.

With dark ground illumination the granular forms appear as chains of minute cocci. The organism is non-motile. Isolation of the organism from contaminated materials is not difficult if the following technique be followed :—

An L1 *bis* Chamberland filter is used and the liquid for filtration is diluted with about 80 volumes of broth at 37° C. The greater part of this is passed through the filter under a 25 cm. of mercury vacuum. Then 10 to 20 cc. of horse serum are passed through and finally the

rest of the diluted virus is passed. The flask containing the filtrate is plugged and incubated. In three or four days turbidity shows itself.

If a Chamberland L2 filter be used no growth is obtained.

The optimum temperature for growth is 37° C., but the temperature limits are 24° to 41·5° C. The organism grows under either aerobic or anaerobic conditions.

Incubated aerobically cultures generally die out in a month, but anaerobic cultures and cultures which are sealed up or under paraffin may be kept in the incubator for as long as 22 months without losing their vitality. Tests for longer periods than this have not been made. At temperatures below that of the body (from 0° to 25° C.) cultures were found to be sterile after five months.

The virus survives a temperature of 50° C. for 1½ hours, but it is killed in 10 minutes by a temperature of 53° C. Under conditions of prolonged incubation and repeated subculture the virulence of the organism remains constant.

Agglutination, complement fixation and precipitin tests have yielded unsatisfactory results.

Experimentally sheep are less susceptible to infection than goats. Subcutaneous inoculation leads to the formation within a week of a small local lesion in the form of a nodule which disappears about 15 days after inoculation. After a period ranging from a week to a month lesions develop elsewhere in the body—the joints and the eyes.

In lactating females mammitis is produced, the secretion becoming purulent.

Intravenous inoculation appears to be very fatal in the goat, death occurring (2 cases) in 8 and 19 days. In cattle inoculation produces only a temporary local lesion.

A large number of methods have been employed with a view to establishing immunity in sheep and goats, but so far certain success has not been achieved.

HRUSKA (Charles). **Recherches expérimentales sur le charbon (Premier mémoire). Les vaccins charbonneux.** [Investigations in connection with Anthrax. First Memoir. The Anthrax Vaccines.] *Ann. Inst. Pasteur.* 1925. Nov. Vol. 39. No. 11. pp. 897–908.

The author's experiments have been carried out with first and second vaccines obtained from the Pasteur Institute, Paris. The vaccines have been transplanted every week on plain agar and during the period 1920–1925 have passed through 255 generations. During the whole of this period no morphological changes have been observed. Cultivated on agar, both vaccines produce spores between the 10th and the 15th day. In broth, on the other hand, spores have not been observed even in cultures four months old. The results obtained may be summarized as follows. In all the tests agar cultures of 18 to 24 hours were used. It appears that after eight generations on agar the first vaccine had become rather more virulent than it was originally as it tended more to prove fatal to guineapigs. But the passage through the guineapig did not appear to have enhanced the virulence. In the tabular statement given it is shown that while three mice died, three guineapigs survived as did also three rabbits.

A twenty-four hours' culture of first vaccine that had become virulent for guineapigs by repeated subcultivation on agar when inoculated into 11 sheep and 500 cattle failed to cause any infection, although in some animals oedema occurred at the seat of inoculation which lasted for periods ranging up to a fortnight. In plain broth and in salt solution the first vaccine becomes avirulent even for mice in three months.

Preserved in the dry state on a rod of glass fixed to the ground-in stopper of a glass flask sealed with paraffin, the vaccine retains its vitality and remains constant in virulence up to five years. Occasionally cases occur in which mortality results from the use of the first vaccine. These are to be explained on one of two hypotheses. Either there is actual inoculation infection with the production of a large amount of oedema or the animals died from naturally contracted anthrax, the vaccine having been injected during the negative phase.

From two cases which terminated fatally and in which there was extensive oedema the author isolated an organism having the characters of the first vaccine.

Experiments with second vaccine grown on agar showed that after some 38 passages virulence was to some degree reduced, so that it was fatal for mice only. Passing this vaccine through mice enhanced its virulence again for the guineapig but not for the rabbit. Passing it through guineapigs in series again increased its virulence for the rabbits. The vaccine may be preserved unchanged in the dry state as already described for years.

In Czecho-Slovakia where certain areas are very heavily contaminated with anthrax outbreaks sometimes occur within 8 to 12 weeks after vaccination. For this reason vaccination is practised twice yearly. The general method is to give the first and second vaccines in 0·25 cc. doses and then ten days after the second vaccine a further dose of 1 cc. of second vaccine.

In some experiments the author found that vaccines sent out by the Charkow Laboratory were not of constant virulence.

RUNNELLS (R. A.) & HUDDLESON (I. F.). **The Nature of** *Bacterium abortus* **Infection in the Udder of the Bovine.**—*Cornell Vet.* 1925. Oct. Vol. 15. No. 4. pp. 376–390. With 3 figs.

Details are given of the examinations carried out with materials derived from the udders of four animals, three of which were infected with contagious abortion, and the fourth was included as a normal control. None of the udders showed any gross histological change, but on microscopic examination of sections there were found small foci of a sub-acute or chronic inflammatory nature. The lesions appeared to originate in the parenchyma and then spread to the interstitial tissue. The supra mammary glands showed evidence of the existence of chronic lymphadenitis. It is noteworthy that in none of the specimens were abortion bacilli discovered by microscopic examination, although their presence in the milk was detected by inoculation and artificial cultivation.

RAMON (G.). **Procédés pour accroitre la production des antitoxines.** [Methods of Increasing the Production of Antitoxins.]—*Ann. Inst. Pasteur.* 1926. Jan. Vol. 40. No. 1. pp. 1–10.

As a general rule the titre of antitoxic sera can be increased up to a certain maximum beyond which no amount of antigen will force it.

Often the titre of such sera tends to fall in spite of increasing hyperimmunization. The author has observed, however, that in horses producing antidiphtheritic serum there is sometimes an unexpected rise in the titre over and above the maximum to which it had been found possible to obtain in the particular animal. Observation showed that in all such cases the animals showing the exalted titre had developed abscesses as the result of contamination with ordinary skin bacteria. It was experimentally demonstrated that the production of an abscess at the seat of inoculation of a hyperimmunizing dose of toxin definitely led to the exaltation of the titre of the serum above the value to which it had been possible to get it prior to the abscess production. It was further found that an abscess produced in some part of the body other than the seat of infection of the hyperimmunizing dose did not produce the effect. It was clearly undesirable to add bacterial contaminations to the antigens for injection, and the author cast about for something which could be added to them which would produce the same effect as suppuration. After a number of trials he found that starch prepared by pulverizing tapioca suited the purpose. The addition of this powder to the antigens used for injection has been applied to the production of both antidiphtheria and antitetanic serum.

In controlled experiments it was found that the antitetanic serum produced with the tapioca was markedly more antitoxic than that produced with the simple antigen. In some cases it was 10 times as strong.

INOUYE (Z.). **A New Method of Staining Flagella and Observation on the Morphological Changes of Flagella, depending upon the Age of Bacteria.**—*Scientific Reports from Govt. Inst. Infect. Dis.* Tokyo. 1924. Vol. 3. pp. 11–15. With 1 plate.

The author recommends the following method :—

A thin film of very dilute suspension of the organism in distilled water is spread on a coverglass, air dried, and fixed by heat.

Place as much as it will hold of the following mordant on the coverglass and heat (well above the flame) until steam rises.

Tannic acid, 20 per cent. aq. sol.	10 cc.
Ferrous sulphate, sat. aq. sol.	5 cc.
Sat. alcoholic fuchsin	1 cc.

Wash thoroughly.

Cover the film with Muir's stain.

Alum, sat. aq. sol.	25 cc.
Gentian violet, sat. alcoholic sol.	5 cc.

Filter and heat over the flame until steam rises. Wash thoroughly, dry, and mount.

Cultures of *Bacillus proteus* were examined at different stages and the author found in young cultures (8 hours' incubation) that not only was the bacillus larger than in older cultures but that the flagella were shorter and more numerous. With increasing periods of incubation the flagella became longer and thicker, but less numerous.

DISEASES DUE TO FILTERABLE VIRUSES.

SCHERN (Kurt). **Immunisierungverfahren gegen Tollwut.** [Immunization against Rabies.]—*Berlin. Tierärzt. Woch.* 1926. Jan. 1. Vol. 42. No. 1. pp. 1–2.

The author gives details of a small number of dogs treated by the Japanese single injection method of vaccinating, and shows that all those treated resisted an inoculation with virus which proved fatal to controls. He states that he has also used a modification of the Japanese technique for the preparation of the vaccine, but gives no particulars.

MERY (M. F.). **Un cas atypique de rage confirmé.** [An Atypical Case of Rabies.]—*Rev. Vét.* 1926. Feb. Vol. 78. No. 2. pp. 102–104.

The case occurred in a Pekingese. This showed marked salivation and rapid champing movements of the jaws. There was no loss of consciousness. The attack lasted a few seconds. A similar attack occurred when the animal was given milk to drink.

During the next two days the attacks became rarer and shorter. The dog died on the third day after it was first seen. At the post-mortem the only abnormality found was a quantity of hair and paper in the stomach. Negri bodies were found in the brain.

BOYD (J. E. M.). **Some Notes on Canine Rabies.**—*Jl. Royal Army Med. Corps.* 1926. Jan. Vol. 46. No. 1. pp. 23–31.

The author gives a general account of the disease for the benefit of officers who have not served in countries where the disease is prevalent.

JACOTOT (H.). **Contribution à l'étude de l'ecthyma contagieux des lèvres, affection des petits ruminants.** [Contagious Ecthyma of the Lips of Small Ruminants.]—*Arch. Inst. Pasteur d'Indochine.* 1925. Oct. No. 2. pp. 235–244.

This is a very contagious papulo-vesicular condition involving primarily the lips and mouths of sheep and goats. Secondary infection of the other natural orifices occurs. The same disease has been recognised for many years in France, and is known to occur in various parts of the world. Different races of sheep vary in susceptibility to the disease. In Annam the animals most seriously affected are the young indigenous goats. While the disease does occur all the year round, definite recrudescences generally make their appearance at the onset of the rains.

Primarily the disease occurs as a papulo-vesicular eruption on the lips, with more or less severe involvement of the submaxillary glands.

In the normal course of the disease the lesions pass through the typical phases of papule-pustule, scab, and healing in about a fortnight. But the course of the disease is generally complicated by spreading to adjacent parts, by lesions becoming confluent, and by mechanical irritation. Prehension of food becomes difficult, and there is as a result great loss of condition. When the disease involves the nostrils respiration is obstructed.

About the 15th day of the disease, in a large proportion of cases, papilloma-like growths develop at the seat of lesions. These disinte-

grate and disappear in the course of a month. Systemic disturbance associated with enteritis or broncho-pneumonia does not occur as a rule unless there is secondary invasion of the lesions accompanied by suppuration. The mortality may reach 50 per cent. in bad outbreaks. The virus is capable of passing through Chamberland L and Berkefeld V filters, but the results obtained by inoculation with filtrate would appear to indicate that only a small proportion of the virus actually passes the filter. The virus is very abundant in the lesions since crusts taken at the 15th day are infective when mashed up 100,000 volumes. The virus can be found in the lesions only. It has not been detected in the blood at any stage of the disease, and even enlarged submaxillary glands appear to be virus-free. The virus has a predilection for skin and mucous membrane, and is readily transmissible to susceptible species by inoculation.

Outside the body the virus may be preserved in glycerine or chloroform for periods up to 3 months. It is readily destroyed by heat.

There are facts which appear to suggest that the virus persists in the Malpighian layer of the skin after lesions have healed. Crusts themselves remain virulent for much longer periods than dilutions of the virus, and in this fact lies the explanation of recrudescences of the disease when fresh animals are introduced.

In spite of the close resemblances between sheep pox and ecthyma, the diseases are quite distinct entities, and immunization against one confers no immunity against the other. A naturally-contracted attack of the disease confers an immunity which is apparently life-long, the establishment of which is gradual and begins about the 10th to 20th day.

The immunity is purely a tissue one. The body fluids cannot be shown to possess any antigenic properties. Vaccination is effected by scarification, using an emulsion of scabs in equal parts of glycerine and water.

In outbreaks among indigenous sheep and goats it is not worth while to intervene because of the small value of the animals, but in imported stock vaccination is essential. Pregnant or suckling animals are vaccinated on the caudal folds, others on the inner face of the thigh.

Vaccination by scarification is far more effective than by subcutaneous inoculation.

GINS (H. A.) & FORTNER (J.). **Experimentelle Maul-und Klauen-seuche beim Kaninchen.** [Experimental Foot-and-Mouth Disease in the Rabbit.]—*Berlin. Tierärzt. Woch.* 1926. Feb. 5. Vol. 42. No. 6. pp. 89–90.

By scarification of the inner side of the lip the authors have been able to produce lesions with guineapig virus. The blisters make their appearance within 24 to 48 hours. The epithelium is readily shed, and complete healing usually takes place within a week.

It was also found possible to set up lesions on the lips by massive intravenous injections of virus from guineapigs. Inoculation experiments back into guineapigs also succeeded. In some of the rabbits inoculated by scarification of the mucous membrane of the lip the disease was responsible for the production of a lesion resembling weeping eczema at the angle of the mouth. In only two cases were lesions found on the tongue itself when that had not been scarified, and in no case was any evidence of generalization obtained.

In about 25 per cent. of cases only was there any invasion of the blood by the virus. This was tested by plantar inoculation of guineapigs; there was, however, in these cases, a slight rise of temperature during the first few days. No deaths from foot-and-mouth disease occurred among inoculated rabbits.

At first some difficulty was experienced in carrying on the infection in series in rabbits, but eventually it was carried to 16 generations before inoculation failed. Recourse was then had to glycerinated virus of the 13th generation, and by means of this it was carried to the 20th generation. To succeed it is necessary to inoculate every two days.

Passage through the rabbit caused no reduction in virulence for the guineapig, but recovered rabbits showed immunity up to over 300 days. The serum of such immune rabbits when mixed (undiluted) with virus in vitro had a sterilizing effect upon it. When diluted 1 in 100 no such effect was produced.

HELM (R.). **Weitere Versuche zur Uebertragung der infektiösen Anämie der Pferde auf Meerschweinchen.** [Further Attempts to transmit Infectious Equine Anaemia to Guineapigs.]—*Berlin. Tierärzt. Woch.* 1926. Jan. 15. Vol. 42. No. 3. pp. 37–42. With 8 charts.

As the result of observations carried out on guineapigs inoculated with blood from cases of equine pernicious anaemia the author comes to the conclusion that the method is of some value.

Account must be taken of evidences of anaemia appearing in the blood, of variations of temperature, and of the appearances presented at the post-mortem.

DI DOMIZIO (G.). **Osservazioni su la produzione del virus per la iperimmunizzazione nella peste bovina.** [The Production of Virus for Hyperimmunizing Purposes in the production of Anti-Rinderpest Serum.]—*La Nuova Vet.* 1925. Oct. 15. Vol. 3. No. 10. pp. 21–24.

The author finds that in Somaliland virus producers, when bled out, yield from 3½ to 4 litres of blood per 100 kilogs. body-weight. He has tried the method advised by MARTOGLIO in 1915 of a partial bleeding followed by washing out the vessels with salt solution and finds that while the average increase in virus obtained amounts to only half a litre per 100 kilogs body-weight, the virus obtained after the injection of salt solution is less virulent than that contained in the whole blood taken at the first bleeding. He therefore concludes that the method is not worth the trouble involved.

MYCOTIC DISEASES.

BUBBERMAN (C.) & HUBER (F. L.). **Over de Immunotherapie bij Lymphangitis epizootica van het Paard.** [Protective Inoculation against Epizootic Lymphangitis.]—*Nederl-Indië Blad. v. Diergeneesk.* 1925. Dec. Vol. 37. No. 6. pp. 516–528.

The authors are of the opinion that it is possible to effect a cure by vaccine treatment provided the cases are not of more than moderate severity, and the animals are in good condition.

Treatment requires about 5 months. Excluding severe cases the percentage of recovery is about 60.

Vaccine therapy is not superior to surgical interference combined with chemical treatment.

OTA (Masao) & GALLIARD (H.). **Sur une teigne trichophytique d'un bovidé du Cameroun produite par une espèce nouvelle de** *Grubyella, G. camerounensis* **n. sp.** [A Case of Ringworm in an Ox caused by *Grubyella camerounensis* n. sp.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 14–21. With 3 text figs.

The lesions presented by the animal were in the form of rounded or oval patches devoid of hair and covered with crusts. The largest measured about 9 centimetres in diameter. They were scattered irregularly over the body. The crusts were readily detached and crumbled easily.

The parasite did not appear to invade the substance of the hairs. The growth was composed of more or less quadrangular segments measuring 5–6μ in width. Dichotomous branching was readily found.

In addition to the chains of spores there was also a sheath composed of rounded or ellipsoid cells. These were as a rule not in rows, but formed a kind of mosaic. The cells measured up to 8μ in diameter and had thick walls.

Mycelium with long cells was not very readily found in the sheaths of growth round the hairs. In artificial cultures, which were obtained in from one to three weeks on Sabouraud's medium, the earliest stage of growth was in the form of a small hemispherical whitish colony, with a very delicate down-like surface. Growth was very slow, and after about six weeks there formed a wrinkled rim or margin around the central hemispheric mass. These colonies measured about 5 mm.

Microscopic examination of the growth reveals striking features. In cultures arthospores predominate particularly in the central parts of young cultures. Mycelium is to be found more readily in the superficial parts of old cultures. Pedunculated chlamydospores frequently occur.

The parasite is readily transmitted to the guineapig, but the infection is quite benign and clears up within a few days.

AYGAR (V. Krishnamurti). **Nasal Granuloma in Cattle.**—*Memoirs Dept. Agric. in India. Veterinary Series.* Vol. 3. No. 6. 1925. Aug. With 9 plates.

Nasal granuloma, or snoring disease, is widespread among cattle in Madras, and possibly in other parts of India. It is not, as was at one time thought, limited to animals having nose strings, but occurs also in cows, heifers and bulls.

The lesions take the form of clusters of rounded growths, each of which may attain the size of a pea. They appear at the junction of the nasal mucous membrane with the skin and round the perforation made in the septum for the nose string. They spread up the nasal fossae causing occlusion. On pressure of larger lesions beads of pus escape, and older lesions tend to break down and to be sneezed out. Microscopic examination revealed the presence of a ray fungus akin to actinomyces bovis. The colonies were found to be very alcohol- and acid-fast. They could not be stained by Gram's method.

BIGOT (A.) & VELU (H.). **Contribution à l'étude des blastomycoses animales.** [Contribution to the Study of the Animal Blastomycoses.]—*Rev. Path. Comparée et d' Hyg. Générale.* 1925. Vol. 25. Nos. 280 & 281. 52 pp. With 10 figs. on 3 plates.

This paper is a summary of our knowledge regarding epizootic lymphangitis of the horse and mule and lachrymal blastomycosis of the donkey.

It is divided into three main sections dealing respectively with (1) the causal organisms; (2) the histology of the lesions; and (3) the pathogenic rôle of the cryptococcus and the associated bacteria in epizootic lymphangitis, and the connexions which exist between human and animal blastomycoses. The authors find that the best media for the cultivation and subcultivation of the cryptococcus are broth, peptone water, and more particularly Sabouraud's agar acidified to 5 per thousand with citric acid.

By using this medium for primary cultures associated organisms are got rid of. Further experiments indicated that while in broth the citric acid exercised a true sterilization action on bacteria, on acidified Sabouraud's agar the growth of these bacteria was merely prevented.

Cryptococcus mirandei can readily be isolated on citric Sabouraud agar, but acidified peptone broth sterilizes the seed material containing this organism.

Cryptococcus mirandei in artificial cultures occurs as a rounded or oval body of very variable size. In cultures of a fortnight's standing filamentous and other elongated forms occur. The organisms will grow in both acid and alkaline media, but growth stops in the latter when the proportion of "soda" added reaches 1·5 per cent. Growth is equally good at 30° C. as at 37° C., but is very slow at room temperature. Acid potato, carrot, beetroot, Jerusalem artichoke, are all good culture media, but of these beetroot appears to be the best. The following liquid media are good:—Malt water, decoction of prunes, Pasteur's liquid, Hayem's liquid, Hansen's liquid No. 1, Cohn's medium.

Glucose and laevulose are fermented with the evolution of gas. Lactose, galactose, mannite, saccharose, and maltose are not affected.

Statistics gathered over a number of years show that vaccinotherapy is not always successful in the treatment of epizootic lymphangitis. This the authors believe to be due to the association of other organisms with the cryptococcus. They therefore suggest the advisability of employing polyvalent vaccines. In examining pus from suspected lesions (buds which have not been ruptured prior to the removal of the pus for examination) the authors have rarely encountered any associated bacteria, but they believe that when marked softening has taken place organisms from the surface can penetrate the skin and so appear as contaminations in the pus.

It has been generally recognized that it is difficult to get satisfactory staining of the organism in smears or sections. Bigot and Velu find that the only fixative which gives good results is Bouin-Dubosq, in which smears are placed for 20–24 hours. Fragments of tissue require rather longer. The specimens are washed in water, then in lithium alcohol to remove as much colour as possible, and again in water. Sections should be passed through lithium alcohol after they have been passed through pure alcohol and 90 per cent. alcohol.

Gram's stain is used. Carbol gentian violet is allowed to act for four hours at least. The iodine is used for five minutes and

decolorization is prolonged. Fuchsin or eosin may be used as counterstains.

Mann's stain (16–36 hours), anilin safronine, haemalum, haemateïn-Tribondeau, eosin, May-Grünwald and panchrome, Giemsa, and other stains may be used, but in all cases the process of staining is very prolonged. Fuchsin, Unnas' blue, Loeffler's blue, carbol-thionine, and Ziehl's stains give poor results.

The examination of the tumour-like growths seen in lachrymal blastomycosis of the mule shows that they are inflammatory enlargements composed for the main part of lymphocytes and plasma cells. Giant cells do not occur. The growths are non-vascular.

In connexion with epizootic lymphangitis the authors describe the histology of the lesions dealing with the nodules of the skin, the corded lymphatics, the enlarged glands, and the ulcerations of the respiratory mucous membranes.

In whatever situation lesions occur they are always histologically of the same type. The invasion of the tissues by the parasite leads to the multiplication of the fixed and migratory connective tissue elements and when the lesions become invaded by pyogenic bacteria polynuclears are attracted.

As a result of their observations and experiments in connexion with the vaccine therapy of epizootic lymphangitis the authors come to the conclusion that staphylococci play no inconsiderable part in the processes of the infection. They may, in fact, change what would be a benign infection into a serious one. The use of staphylococcus vaccine in conjunction with pyotherapy in ten cases produced markedly favourable results.

Bigot (A.) & Velu (H.). **Des Indications que l'on peut tirer au point de vue vaccinotherapie de l'étude Anatomo-pathologiques des lesions (à propos des Blastomycoses).**—*Maroc Médical.* 1925. Feb. 15. No. 38.

This paper is an abbreviated form of the above.

MISCELLANEOUS.

Muto (K.). **On the Toxic Action of Carbon Disulphide.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Dec. Vol. 4. No. 4. pp. 346–348. [Author's English abstract.]

Both cocaine and atropine are antagonistic to carbon bisulphide.

In rabbits dying as the result of inhalation of carbon disulphide haemorrhages are found in the bronchial mucous membranes. The internal administration of the drug produces, if toxic doses be used, haemorrhages of the gastric mucosa and erosions of the mucous membrane of the small intestine.

Curson (H. H.). **Some Little Known South African Poisonous Plants and their Effects upon Stock.**—M.S. Thesis for the Fellowship Diploma R.C.V.S. 1925.

The following plants have been proved to be toxic: *Moraea polystachya*, Ker., *Moraea spathacea*, Ker., *Homeria pallida*, Baker,

Urginea burkei, Baker, *Senecio latifolius*, D.C., *Setaria sulcata*, Raddie, *Cotyledon wallichii*, Harv., *Cotyledon ecklonii*, Harv., *Dichapetalum cymosum*, Hook, *Acokanthera venenata*, G. Don., *Cynanchum africanum*, R. Br., *Melianthus major*, Linn., *Ornithogalum tenellum*, Jacq., and *Melothria punctata*, Cogn.

The poisonous nature of all of these save the last five was already known and the author limits himself to a description of his work in connexion with those the toxicity of which had not previously been determined.

Acokanthera venenata.—The author uses this name to cover what may possibly be two species, *A. venenata* and *A. spectabilis*. But SIM believes these to be only local varieties depending upon their surroundings.

Cattle are the principal victims, but cases of poisoning have been recorded in goats, donkeys and ostriches. The symptoms are abdominal pain, often with dysentery, frequent urination, salivation, cold extremities, jugular pulse, laboured respiration and possibly froth from the nostrils.

Cynanchum africanum.—The symptoms of poisoning are staggering gait in the early stages with chronic spasms of groups of muscles, followed by collapse and tetanic spasms. There is apparent complete loss of consciousness. In severe cases there may be opisthotonus, with convulsive movements of the limbs. In mild cases the attitude, which is characteristic of milk fever, is often assumed.

Melianthus major.—It is possible that the five species of Melianthus are all toxic. The symptoms in cases observed by the writer were those of an irritant vegetable poison : acute diarrhoea with dysentery, colic and salivation.

Melothria punctata.—Curson has not seen cases of poisoning by this plant, but in cases in which it was suspected the symptoms produced were those generally caused by gastro-intestinal irritants.

Ornithogalum tenellum.—Horses suffering from poisoning by this plant show at first dullness and disinclination to feed. This is followed by a rise of temperature and purgation, with accelerated pulse and respiration. Later the pulse becomes weak and the temperature falls to subnormal. In the final stages there is acute abdominal pain.

The author deals with each plant referred to from a botanical point of view and also gives an account of the literature containing references. His paper is illustrated with photographs of the plants, and in one or two instances of animals suffering from poisoning.

An appendix contains the details of the experiments carried out with the plants.

PUNTONI (V.). **La préparation de l'azur de méthylène au moyen de l'ozone et son emploi pour les colorations par la méthode de Romanowski.** [The Preparation of Azur by means of Ozone, and its Use in making Romanowsky Stains.]—*C.R. Soc. Biol.* 1926. Jan. 15. Vol. 94. No. 1. pp. 21–23.

Medicinal methylene blue, or methylene blue of less pure quality containing zinc chloride is dissolved to the strength of 2·5 per cent. in 1 per cent. of sodium carbonate solution. The liquid is incubated for 24 hours with repeated shaking. There is a slight sediment from which the solution is separated by careful decanting.

Ozonized air obtained from a Siemen's ozonizer is bubbled through the liquid for 48 hours, by which time it is almost colourless, having only a greenish tint. An insoluble basic precipitate of methylene azur adheres to the sides of the vessel. The liquid is thrown away and the vessel is placed in an incubater. During the next 24 hours the sediment dries and is at the same time converted into a soluble carbonate by the carbon dioxide of the air. The precipitate is readily collected by scraping the walls of the vessel. Twenty-five grammes of methylene blue yield about 12–13 g. of azur. This dye corresponds exactly with Azur I of giemsa (Azur P).

To prepare a Romanowsky stain grind together :—

Azur P.	0·3 g.
Medicinal methylene blue Höchst	0·15 g.
Eosin A.B. Grübler	0·15 g.

Add 50 cc. of pure glycerine and after thorough mixing add 50 cc. of pure methyl alcohol. Incubate for 24 to 48 hours with frequent gentle shakings. Filter and store in a coloured glass bottle with a glass stopper.

For use make a 1 in 20 (1 drop per cc.) dilution in neutral distilled water.

Lowe (H. T.). **A Veterinary Survey of the Bukoba District, Tanganyika Territory.** —*Vet. Jl.* 1925. Dec. Vol. 81. No. 12. pp. 592–608.

BOOK REVIEW.

Banham (George A.) [F.R.C.V.S.] & Young (Wm. J.) [F.R.C.V.S., D.V.S.M. (Vict.).] **Table of Veterinary Posology and other Information for the Use of Students and Practitioners.**—pp. ix+359. 5th Edition. 1926. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden, W.C. 2. [Price 8s. 6d. net.]

A new (fifth) edition of this work has just made its appearance in its usual garb of post-office red. The number of pages has been increased to 360 by the inclusion of new matter, but this enlargement has a tendency to take it out of the " pocket " class. A casual glance through the volume creates the impression that it contains much valuable matter put together in a convenient form. Unfortunately a closer inspection shows that though a great part of the material is new and up-to-date, yet there is a superfluity of the ancient. The tables of posology, which give the book its title, extend over 29 pages, and contain most of the drugs commonly used and many that are not. Carbon tetrachloride is absent, though it appears in a later section. The doses and the strengths of preparations leave a lot to be desired. There is evidence that they have not been thoroughly revised. For instance, the dose of dry extract of nux vomica for the dog is given as 1 grain under one heading, and one-tenth grain under another. With regard to the tinctures, which are always interesting to posologists, an effort might have been made to group them under three doses as in the British Pharmacopoeia. What do we find ? The maximum

dose for a dog of seven tinctures taken at random from the list differs in each case, thus: Calumba 1 drachm, gentian 1½ drachm, iron 30 minims, opium 20 minims, nux vomica 10 minims, paregoric 40 minims, aconite 5 minims. The tinctures of iron, opium and nux vomica can all be given to the dog in maximum doses of 15 minims, and calumba, gentian and all such harmless tinctures, including paregoric, in doses of 1 drachm. Strangely enough, the dose of strong tincture of iodine is given as 7–20 minims, surely a heroic dose.

The section devoted to synonyms is interesting, but contains much redundant matter. For instance, it may not be generally known that white precipitate is ammoniated mercury, but it seems hardly necessary to inform us that white precipitate ointment is ammoniated mercury ointment (in Latin). One entry is beyond understanding, namely, "cuprea bark," or "copper nucleinate." The title of the next section is open to discussion. It is called a Dictionary of Chemical Solubilities, but solution is generally considered a physical phenomenon.

The sections devoted to what might be termed the treatment of disease cannot be criticized in the same way as those we have dealt with above as they are concerned with matters about which there may be honest differences of opinion.

Altogether the work leaves one with a feeling of disappointment. Perhaps the scope has become too ambitious, and the accuracy of figures has suffered from the demands made by the therapeutical portions of the volume. We would advise the authors in the next edition to thoroughly overhaul the tables of doses, removing many items, and adding a few. At the same time a grouping of the drugs according to their doses might be adopted. Finally, it would not be disadvantageous to use more English and less Latin, because the employment of the latter language leads to mistakes in grammar, especially in the cases of nouns.

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